Drink Less Enjoy More

Quigg, Zara; Hughes, Karen; Butler, Nadia; Ford, Kat; Canning, Ian; Bellis, Mark A

Addiction

DOI:
10.1111/add.14223

Published: 01/08/2018

Peer reviewed version

TITLE: Drink Less Enjoy More: effects of a multi-component intervention on improving adherence to, and knowledge of, alcohol legislation in a UK nightlife setting

AUTHORS: Zara Quigg [a], Karen Hughes [b c], Nadia Butler [a], Kat Ford [c], Ian Canning [d], Mark A Bellis [b c]

[a] Public Health Institute, Liverpool John Moores University, Liverpool, UK

[b] Policy Research and International Development Directorate, Public Health Wales, Cardiff, UK

[c] School of Healthcare Sciences, Bangor University, Bangor, UK

[d] Public Health Department, Liverpool City Council, Liverpool, UK

CORRESPONDING AUTHOR:

Zara Quigg

Public Health Institute

Liverpool John Moores University

2nd Floor Henry Cotton Campus, 15-21 Webster Street, Liverpool, L3 2ET, UK

Tel: +44 (0)151 231 4513 Fax: +44 (0)151 231 4552

Email: z.a.quigg@ljmu.ac.uk

RUNNING HEAD: Preventing sales of alcohol to drunks

WORD COUNT: 3497

DECLARATIONS OF COMPETING INTEREST: None declared.

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/add.14223

ABSTRACT

Aims: To estimate the association between implementation of a community-based multi-component intervention (Drink Less Enjoy More) and sales of alcohol to pseudo-intoxicated patrons and nightlife patron awareness of associated legislation.

Design: Cross-sectional pre-intervention and follow-up measurements including alcohol test purchases (using pseudo-intoxicated patrons) in licensed premises (stratified random sample; 2013, 2015) and a survey with nightlife patrons (convenience sample; 2014, 2015).

Setting: One UK municipality with a large night-time economy.

Participants: Licensed premises (pre=73; follow-up=100); nightlife patrons (pre=214; follow-up=202).

Intervention: The Drink Less Enjoy More intervention included three interacting components: community mobilisation and awareness raising; responsible bar server training; and active law enforcement of existing legislation prohibiting sales of alcohol to, and purchasing of alcohol for, a person who appears to be alcohol intoxicated: 'intoxicated', herein for economy.

Measurements: The primary outcomes were alcohol service refusal to pseudo-intoxicated patrons and nightlife patron knowledge of alcohol legislation (illegal to sell alcohol to, and purchase alcohol for, intoxicated people), adjusted for potential confounders including characteristics of the area, venue, test purchase, and nightlife patron.

Findings: Pre-intervention, 16.4% of alcohol sales were refused, compared with 74.0% at follow-up (p<0.00l). In adjusted analyses, the odds of service refusal were higher at follow-up (adjusted odds ratio [AOR] 14.6, p<0.001). Service refusal was also associated with server gender and patron drunkenness within the venue. Amongst drinkers, accurate awareness of alcohol legislation was higher at follow-up (sales: pre, 44.5%; follow-up, 66.0%; p<0.001 / purchase: pre, 32.5%; follow-up, 56.0%; p<0.001). In adjusted analyses, knowledge of

legislation was higher at follow-up (sales: AOR 2.7, p<0.001; purchasing: AOR 2.7, p<0.001). Knowledge of legislation was also associated with participant age (purchasing) and expectations of intoxication (sales).

Conclusion: A community-based multi-component intervention concerning alcohol sales legislation in the UK was associated with a reduction in sales of alcohol to pseudo-intoxicated patrons in on-licensed premises in a UK nightlife setting and an improvement in nightlife patron awareness of associated legislation.

Key words: alcohol, intoxication, nightlife, intervention, legislation, community

INTRODUCTION

Nightlife settings are often characterised by high levels of drunkenness and associated harms [1-4]. The management of nightlife areas, and efforts to prevent or minimise harms, thus place heavy demands on police and public services [5, 6]. Nevertheless, nightlife drunkenness appears to be accepted across a plethora of countries, with various studies identifying high levels of alcohol consumption [1, 4, 7-9] and alcohol over-service to drunk or pseudo-intoxicated patrons [9-16]. This is despite over half of all countries globally having implemented legislation to prohibit the sale of alcohol to drunks [17]. In England and Wales it is illegal to knowingly sell alcohol to, or purchase alcohol for, a drunk person [18]. However, studies suggest a dearth of public awareness of the legislation and, critically, that bar staff are not always adhering to it [10, 19]. Further, prosecutions for breaching the legislation are extremely scarce (e.g. two in 2014 [20]). The low detection and prosecution of offences are thought to result from difficulties in defining and recognising drunkenness, and a lack of political will to address the acceptability of nightlife drunkenness [9, 21].

Internationally, preventing excessive drunkenness in nightlife is a public health priority [17]; with evidence suggesting a dose-response relationship between alcohol consumption and exposure to harms, directly (e.g. injury [22]) and indirectly (e.g. exposure to harm from other people's alcohol consumption [23]). Whilst the evidence base is limited [24, 25], research increasingly suggests that multi-component community-based programmes may be an effective prevention measure [24-27]. In Europe, the prevalence of such interventions is increasing, with the most well established and successful being the STAD (Stockholm Prevents Alcohol and Drug Problems) programme [28, 29]. This includes multi-agency planning, community mobilisation, strengthened law enforcement and responsible bar server (RBS) training, and has been associated with significant reductions in the sale of alcohol to pseudo-intoxicated patrons and related harms in nightlife [12, 28, 29]. Similar interventions have been developed and implemented in other countries (e.g. SALUTT, Norway; PAKKA, Finland), however evidence of their effectiveness is mixed [13, 30].

In England and Wales, it is mandatory for statutory partners to collaborate locally to address crime and disorder [31]. Through these partnerships, a broad range of strategies have been implemented to promote safer nightlife, including targeted police enforcement and environmental measures to improve safety [32]. However, such strategies have appeared to

do little to discourage or reduce the acceptability of excessive drunkenness inherent in nightlife settings [1, 19, 33], and critically there has been a scarcity of interventions aiming to address sales of alcohol to drunk patrons, or use of associated legislation [10, 21]. To address this, based on existing evidence [12, 13, 30], a community-based multi-component intervention (Box 1) was developed and implemented in Liverpool City Centre's nightlife (North West England) via a local multi-agency partnership (public health, licensing, police, academia). The study aimed to estimate the strength of association between implementing DLEM and changes in: 1) alcohol sale refusals to pseudo-intoxicated patrons, and 2) nightlife patron knowledge of associated alcohol legislation (considered to have benefits in supporting service refusal).

METHODS

The intervention

The intervention included three interacting components: community mobilisation and awareness raising; RBS training; and active law enforcement of existing legislation prohibiting sales of alcohol to, and purchasing of alcohol for, drunks. The intervention was piloted over five-weeks in autumn 2014 (Say No to Drunks) across a section of the nightlife area (~38 on-licensed premises). Following initial evaluation [33], and consultation with nightlife patrons the intervention was refined, rebranded (Drink Less Enjoy More [DLEM]) and in autumn 2015 implemented across the full nightlife area (~220 on-licensed premises) over a nine-week period.

Intervention implementers attended pre-existing meetings held between on-licensed premises, and subsequently discussed the intervention, gaining support and addressing queries. Letters were distributed to all premises by enforcement partners providing information on: the intervention; opportunities for engagement (e.g. media) and support (e.g. RBS training/intervention materials); and alcohol legislation. Intervention resources were developed and tailored towards those working in and using the nightlife environment, including information sheets, posters and T-shirts. Additional branded materials were developed for DLEM (e.g. bar runners/radio advertisements), with messages redefined to reflect the broadened intervention focus (e.g. to discourage excessive preloaded alcohol consumption [33]). In 2014, 38 premises received intervention materials, 60 in 2015. A webpage (http://drinklessenjoymore.co.uk/) and social media accounts were used to promote

the intervention. Communications suggested that DLEM formed part of a long-term approach to preventing alcohol-related harms. Each year, a press release promoted the intervention, and media interviewees were held in license premises with stakeholders (e.g. municipality officials).

An existing RBS training programme, focusing on preventing underage alcohol, was extended to include preventing sales to drunks. The training covered: identifying drunkenness and underage patrons; alcohol legislation and implications of flouting the legislation; service refusal/conflict management; and patron vulnerability/safety. The programme was funded by the municipality, promoted to venues (e.g. via letter) and provided freely to venues requesting it. Overall, the one-hour training was delivered face-to-face within venues to 1295 bar staff.

Local police and government representatives implemented active enforcement activity focusing on the alcohol legislation. Activity involved contacting venues (e.g. in pre-established meetings, via letter) to emphasise legislation and notify them that the authorities would monitor adherence through various methods (e.g. unscheduled visits to venues). On one night in 2015, the sale of alcohol to drunk nightlife patrons was witnessed by police officers in three venues. Subsequently, officers held discussions with venue managers/owners and bar staff to reiterate the legislation and issue verbal warnings. No penalties (e.g. fines) were issued, however warnings stressed that if such sales were identified again, fines would be issued.

Study design

A cross-sectional study with measurements at pre-intervention and follow-up. To measure alcohol sales, based on existing studies [12,14] alcohol test purchases using pseudo-intoxicated actors in on-licensed venues were implemented. Pre-intervention (2013), venues (n=73) were randomly selected from all city centre pubs, bars and nightclubs (n=317). Proportionate allocation sampling was used with venues stratified by permitted closing times (based on licensing conditions). At follow-up, a new sample of venues (n=100/221) was selected using the same method. To measure patron awareness of legislation, a survey was implemented with patrons in situ. Surveys were administered opportunistically (i.e. convenience sample) on the street by researchers through an interview process with eligible participants (i.e. aged 18+ years; on a night out; able to provide informed consent). Nearly half (49.4%) of individuals approached pre-intervention (438 individuals) and a third (34.3%)

at follow-up (318 individuals) refused to participate. 222 individuals took part pre-intervention and 209 at follow-up. Based on a 95% confidence level and 80% power, sample sizes were adequate to detect anticipated effects sizes (i.e. refusal rate, increase from 16%-40%; sales legislation knowledge, increase from 45%-60% [34]). Both phases of data collection were coordinated by the same researcher, however different actors and researchers were used to implement the study. Actors/researchers were not blinded to study aims. Ethical approval was obtained from Liverpool John Moores University; the study adhered to the Declaration of Helsinki.

Alcohol test purchases

Young (18-22 years) male (n=6) and female (n=8) student actors were recruited through an audition process and trained to use a standard act for pseudo-intoxicated alcohol purchase attempts developed and tested with police (who can legally act as expert witnesses for determining drunkenness). A very high level of intoxication was portrayed through key indicators (e.g. slurred speech) and sufficient interaction occurred between actors and bar servers to allow indicators to be observed [10]. Each test purchase attempt was made by two actors and observed by two researchers (Wednesday–Sunday, 21:00–04:00). Researchers entered venues first to surreptitiously observe purchase attempts and venue characteristics. Upon completion of the test purchase, actors left the venue, followed by researchers [10]. Researchers and actors then independently completed structured observational schedules detailing venue characteristics [2] and, aspects of the alcohol purchase attempt [10] (Table 1).

Nightlife patron survey

A short, anonymous survey was developed including questions on: demographics; nightlife usage; alcohol consumption patterns on the night of survey; expectations of drunkenness; and knowledge of legislation. Surveys were administered on a Friday and Saturday (21:00-04:35). Prior to approaching potential participants, researchers visually assessed their level of intoxication based on criteria used by the police [35]. Individuals who were so intoxicated that they could not reasonably consent to participate in the study were not approached. Potential participants were provided with a verbal study description, and asked if they had time to complete the survey. Those who were interested were provided with an information sheet and opportunity to ask questions before the researcher confirmed that they consented to proceed. Following recruitment, 15 individuals were later deemed too intoxicated to

participate, and the survey was ended at an appropriate time. Thus, 214 pre-intervention and 202 follow-up surveys were included in analyses.

Measures

The study included three dependant variables: 1) alcohol sale refusals; and knowledge of alcohol legislation on 2) sales of alcohol to drunks and 3) purchasing of alcohol for drunks. Key predictors included area, venue and test purchase characteristics (Table 1); and patron characteristics (Table 3). Alcohol consumption was converted to UK units (1 unit=8 grams of pure alcohol) using these conversions: small/standard/large glass of wine (1.5/2.1/3.0); pint/bottle/can of lager/beer/cider (2.0/1.7/2.0); bottle of alcopops, 1.5; a single (25ml) shot of spirits, 1.0; and a pitcher of cocktail, 6.0 [36].

Analyses

Chi-squared and Mann-Whitney U (alcohol consumption data; not normally distributed) were used for unadjusted examination of sample characteristics between pre-intervention and follow-up, and between dependant and predictor variables. Logistic regression (backward conditional) was employed to estimate the association between dependant and predictor variables. For the dependant variables around knowledge of legislation, independent variables included intervention time period (pre/follow-up) and patron characteristics, including alcohol consumption and drunkenness (see Table 4). For alcohol sale refusals, independent variables included intervention time period and venue and test purchase level confounders (see Table 2). In addition, an interaction term between research team (drunk actor/observers) and intervention time period (pre/follow-up) was included in order to identity any random effects relating to the team undertaking the alcohol test purchases. Analyses was undertaken in SPSS (v21).

RESULTS

Alcohol test purchases

Findings from the pre-intervention test purchases are presented in Hughes et al [10]. Using markers of poorly managed and problematic (PMPs) venues as measures of venue characteristics, between pre-intervention and follow-up there were no significant differences in the number of PMPs venues had (p=0.377) or the types of PMPs, except for the marker dirty bar (p=0.010: Table 1). A significant difference in service refusal rate was observed

between pre-intervention (16.4%) and follow-up (74.0%) test purchases (p<0.00l). In bivariate analyses only two other predictors were associated with service refusal (dirty bar and drunk customers; Table 2). In adjusted analyses, the odds of service refusal were significantly higher when DLEM was in place (p<0.001), and if the server was female (p=0.032). Alcohol service refusal was significantly lower if the venue had drunk customers present (p=0.019; Table 2). The interactive term was non-significant (p=0.465), meaning there was no heterogeneity (clustering) due to individuals undertaking the test purchases.

Table 1 and 2 here

Nightlife patron survey

No significant demographic differences were identified between pre-intervention and follow-up survey participants (Table 3). The majority of participants had consumed alcohol prior to survey participation (i.e. pre, 95.8%; follow-up, 92.1%; p=0.111). Of those who reporting drinking prior to survey completion, the majority reported preloading (i.e. drinking at home/another's home, and/or on the way to the nightlife environment in public and/or on transportation: pre, 68.3%; follow-up, 60.5%; p=0.11). Total median expected alcohol consumption over the course of the night out (including alcohol consumed up to the point of survey, and expected to be consumed post survey) was higher amongst follow-up participants (20.0 units; pre-intervention, 15.7 units, p=0.008 Table 3). Around half of pre-intervention and follow-up participants who had, or expected to consume alcohol (i.e. drinkers), expected their level of drunkenness to be high when they left the city's nightlife that night (Table 3).

Table 3 here

Overall, the proportion of drinkers who correctly reported that it is illegal to sell alcohol to someone who is drunk was higher amongst those who: completed the follow-up survey (p<0.001: Figure 1); expected to have a low level of drunkenness when they left the city that night (62.4%; high, 48.9%; p=0.007); and were local residents (61.0%; non-resident, 49.0%; p=0.016). The proportion who correctly reported that it is illegal to purchase alcohol for someone who is drunk was higher amongst follow-up participants (p<0.001: Figure 1); associations were also found with age group (p=0.009; Table 4). In adjusted analyses (Table 4), accurate awareness of both aspects of legislation was higher amongst follow-up participants (p<0.001). Knowledge of sales legislation was lower amongst those who

expected to have a high level of drunkenness when they left the city that night (p=0.003). Purchasing legislation was associated with age group (p=0.009).

Figure 1 and Table 4 here

DISCUSSION

This study presents an evaluation of the first UK intervention (DLEM) that aims to change nightlife cultures of excessive intoxication through addressing the sale of alcohol to drunks, following a community-based multi-component approach. We explored two key factors: the refusal of alcohol sales to pseudo-intoxicated patrons in nightlife venues, and nightlife patron knowledge of associated legislation. Our study found a significant difference in these factors between pre-intervention and follow-up measurements. Critically, compared to pre-intervention, the odds of alcohol sale refusals was over 14 times higher at follow-up. Further, our follow-up sample of nightlife patrons were more than twice as likely to be aware of alcohol legislation, compared to the pre-intervention sample.

Various studies suggest that drunkenness in UK nightlife settings is culturally accepted and expected [10, 35, 37]. Our study supports this, demonstrating high levels of expected alcohol consumption and drunkenness amongst our samples of nightlife patrons, and, at pre-intervention sales of alcohol to pseudo-intoxicated patrons. DLEM aimed to address the culture of drunkenness in Liverpool's nightlife through improving adherence to, and knowledge of alcohol legislation (factors often addressed in similar interventions [30, 38]). Critically, our study found an association between both of these aspects. Alcohol sales to pseudo-intoxicated patrons were significantly more likely to occur in venues that had drunk customers present, whilst nightlife patrons who expected to achieve a high level of drunkenness were significantly less aware of alcohol legislation. Thus, increasing adherence to, and knowledge of, alcohol legislation may provide an opportunity to modify the cultural acceptability, and subsequently the prevalence of nightlife drunkenness, similar to changes seen in drink driving [9]. Similar to other studies [11, 14, 39], we found that service refusal was more likely when the server was female; a potential consideration for the targeting of RBS training and intervention communication towards bar staff.

Changing cultures of intoxication is, however, a complex task that will not only take time but also requires substantial effort. Given the size and lucrative nature of the alcohol industry

internationally, the impact of local community-based interventions may be limited if not supported by broader prevention efforts. Alcohol price and promotion will inevitably have a substantial role in promoting and/or preventing excessive alcohol consumption [17]. For instance, the price discrepancy between on and off-licensed premise alcohol sales (with the latter most often substantially cheaper) will likely be an influential factor in preloaded alcohol consumption. Similar to other studies [1, 4, 19], our study identified preloading as a common drinking behaviour. Previous evidence suggests that preloading is associated with excessive alcohol consumption (and related harms) in nightlife settings, and critically, is not a substitute for the consumption of alcohol in nightlife [1, 4, 40]. Whilst DLEM may reduce the likelihood of continued or increased intoxication whilst in nightlife, through preventing sales of alcohol to drunks, reducing preloading will inevitably support this further. However, studies suggest that preventing preloading may be more complex than addressing on and off-license alcohol prices alone, due to its association with other social factors (e.g. bonding between friends [41]). Thus, it is important that nightlife patrons' motivations (and other influential factors) for preloading and drunkenness are further understood to inform prevention activity. This is vital given that effective implementation of DLEM will mean that many nightlife venues will be refusing alcohol service to patrons who will have formed a substantial part of their client base, particularly later in the night [35]. Thus, to sustain a thriving nightlife environment, patrons may need to be encouraged (e.g. through diversification of the nightlife environment), and not just prevented, to visit and utilise nightlife spaces in both a less inebriated state, and without the aim of achieving extreme drunkenness.

Our study supports evidence from a number of countries suggesting that the implementation of community-based multi-component interventions may lead to a reduction in alcohol over-service to pseudo-intoxicated patrons [13, 24, 25, 27-29]. However, when interventions have been transferred or rolled out, evaluations suggest varying levels of effect, potentially due to intervention fidelity, and/or differences in structural (e.g. partnership working practices) and cultural (e.g. alcohol consumption) factors between settings [13, 30, 38]. In England and Wales, preventing alcohol-related harms in nightlife is grounded in a multi-agency approach that often incorporates many of the individual components included in multi-component interventions (e.g. targeted policing [32]). This existing approach supported the development and implementation of DLEM; however DLEM was novel in that it implemented various components collectively to address an issue that, until recently, has been a somewhat

accepted aspect of UK nightlife - sales of alcohol to drunks [21]. Our study found a greater increase in service refusal compared to a similar intervention [28,29], and the intensified multi-component approach is felt to be crucial in eliciting this change. Further, stakeholders noted that the simple threat of legislative enforcement was influential in changing bar server practices. Whilst more robust and longer-term evaluation is required, this study (and others [19, 42]) suggest that an intervention of this nature can be implemented in UK nightlife settings, and potentially have a positive impact. Such findings are valuable in informing the development of interventions to prevent sales of alcohol to drunks - an increasing priority for UK government [43], and legislation in many countries [17].

Our study had no control site, thus causation cannot be established. Further, other unmeasured factors may have influenced the changes observed, although no other interventions were in place in Liverpool (or surrounding areas) that would be likely to elicit the changes observed. Further, a comparable study implemented at the time of our follow-up test purchases in an equivalent nightlife area (with no intervention), had a similar refusal rate to our pre-intervention study (Liverpool, 16.4%; comparable area, 19.2% [42]), increasing confidence in our findings. As the test purchases were used as part of DLEM to display a threat of enforcement across all venues (and not just venues included in the pre-intervention sample), stratified random sampling of venues was used during both waves. Thus, there was not an opportunity to return to the same venues tested pre-intervention, and implement a repeated-measures study. To ensure venues matched as closely as possible however, we selected venues by strata, and collected information on venue, test purchase, server and actor characteristics, to allow any differences in sample characteristics to be identified. A larger sample of venues were included at follow-up, as venues were to be provided with their venue result by enforcement officers as part of DLEM. The nightlife patron survey cannot be considered representative and findings should be extrapolated with caution. The survey was implemented opportunistically, samples sizes were small (~200), and at follow-up, due to wet weather conditions, fewer nightlife patrons were present, thus the number of patrons approached was lower than pre-intervention, and refusal rates varied. Finally, due to ethical considerations, individuals who were visually assessed as being severely intoxicated were excluded, and we were unable to verify survey participants estimated alcohol consumption, however researchers were trained on how to explore alcohol consumption in detail (e.g. by drink type/amount) and accurate recording of data. Although pre-intervention and follow-up

data collection was conducted in different months, all data collection was done during times of typical nightlife activity (e.g. outside of holiday periods).

Globally, many nightlife settings are characterised by high levels of alcohol over-service, drunkenness and related harms. Our study provides early indications that a multi-component approach to preventing sales of alcohol to drunks can be successfully implemented in the UK. Critically, DLEM appears to have been associated with a reduction in sales of alcohol to pseudo-intoxicated patrons, and improvement in nightlife patron knowledge of associated legislation. Although wider impacts on addressing drunkenness were not observed, it is important that DLEM is recognised as a crucial first step in a developing body of work to prevent alcohol-related harms in nightlife. Other studies demonstrate the importance of implementing interventions consistently over a sustained period, in order for changes to be maintained [12, 26]. To do so, political and community will to implement sustained changes are paramount, both of which are currently developing in the UK and elsewhere [43, 44]. Whilst our study suggests that DLEM may be an effective intervention, further investigation and consideration is required to identify if it can effectively address excessive intoxication and related harms in nightlife in the longer-term.

ACKNOWLEDGEMENTS

We are grateful to all those who contributed to the development and implementation of DLEM, and the study. In particular: funders (the Citysafe Partnership, Liverpool City Council Public Health and Liverpool Clinical Commissioning Group); study participants; Llew Llewellyn and the actors from Liverpool Screen School (LJMU); and field researchers particularly Katie Hardcastle, Emma Begley, Gordon Hay and Adam Caris.

CONTRIBUTIONS

ZQ advised on intervention design, designed and directed the study, managed data collection, analysed the data and produced the manuscript. KH directed the pre-intervention pseudo-intoxicated actors study, advised on intervention design and assisted in designing the study. NB contributed to data organisation and cleaning, and assisted with the literature review. KF assisted with the management of data collection and contributed to fieldwork. IC led the development and implementation of DLEM. MAB conceptualised the pre-intervention pseudo-intoxicated actors study, and advised on statistical analyses. All authors contributed to the editing of the manuscript and agreed the final text.

REFERENCES

[1] Hughes K, Anderson Z, Morleo M, Bellis MA. Alcohol, nightlife and violence: the relative contributions of drinking before and during nights out to negative health and criminal justice outcomes. *Addiction*. 2008;103(1): 60-5.

[2] Graham K, Bernards S, Osgood DW, Wells S. Bad nights or bad bars? Multi-level analysis of environmental predictors of aggression in late-night large-capacity bars and clubs. *Addiction*. 2006;101(11): 1569-80.

[3] Graham K, Bernards S, Abbey A, Dumas T, Wells S. Young women's risk of sexual aggression in bars: the roles of intoxication and peer social status. *Drug and alcohol review*. 2014;33(4): 393-400.

[4] Santos MG, Paes AT, Sanudo A, Andreoni S, Sanchez ZM. Gender differences in predrinking behavior among nightclubs' patrons. *Alcoholism: clinical and experimental research*. 2015;39(7): 1243-52.

[5] Drummond C, Phillips T, Coulton S, Barnaby B, Keating S, Sabri R. National prevalence survey of alcohol-related attendances at accident and emergency departments in England. *Alcoholism: clinical and experimental research*. 2005;29(5): 36A.

[6] Anderson Z, Hughes K, Bellis MA. *Exploration of young people's experience and perceptions of violence in Liverpool's nightlife*. Centre for Public Health, Liverpool John Moores University, Liverpool. 2007.

[7] Hughes K, Quigg Z, Bellis MA, Calafat A, Hasselt NV, Kosir M, Voorham L, Goossens FX, Duch M, Juan M. Drunk and disorganised: relationships between bar characteristics and customer intoxication in European drinking environments. *International journal of environmental research and public health.* 2012;9(11): 4068-82.

[8] Clapp JD, Reed MB, Min JW, Shillington AM, Croff JM, Holmes MR, Trim RS. Blood alcohol concentrations among bar patrons: a multi-level study of drinking behavior. *Drug and alcohol dependence*. 2009;102(1): 41-8.

[9] Graham K, Miller P, Chikritzhs T, Bellis MA, Clapp JD, Hughes K, Toomey TL, Wells S. Reducing intoxication among bar patrons: some lessons from prevention of drinking and driving. *Addiction*. 2014;109(5): 693-8.

[10] Hughes K, Bellis MA, Leckenby N, Quigg Z, Hardcastle K, Sharples O, Llewellyn DJ. Does legislation to prevent alcohol sales to drunk individuals work? Measuring the

propensity for night-time sales to drunks in a UK city. *Journal of Epidemiology and Community Health.* 2014;68(5): 453-6.

[11] Buvik K, Rossow I. Factors associated with over-serving at drinking establishments. *Addiction.* 2015;110(4): 602-9.

[12] Wallin E, Gripenberg J, Andréasson S. Overserving at licensed premises in Stockholm: effects of a community action program. *Journal of studies on alcohol*. 2005;66(6): 806-14.

[13] Holmila M, Warpenius K. Community-based prevention of alcohol-related injuries: Possibilities and experiences. *The international journal of alcohol and drug rese*arch. 2013;1(1): 27-39.

[14] Lenk KM, Toomey TL, Erickson DJ. Propensity of alcohol establishments to sell to obviously intoxicated patrons. Alcoholism: clinical and experimental research. 2006;30(7): 1194-9.

[15] Donnelly N, Briscoe S. Signs of intoxication and server intervention among 18-39 year-olds drinking at licensed premises in New South Wales, Australia. *Addiction.* 2003;98(9): 1287-95.

[16] Gosselt JF, Hoof JJ, Goverde MM, Jong MD. One more beer? Serving alcohol to Pseudo-intoxicated guests in bars. *Alcoholism: clinical and experimental research.* 2013;37(7): 1213-9.

[17] World Health Organization. *Global status report on alcohol and health 2014*. Luxembourg. 2014.

[18] Licensing Act 2003. [cited 2/10/2017]. Available from: http://www.legislation.gov.uk/ukpga/2003/17/contents/enacted.

[19] Quigg Z, Ford K, Butler N, Hardcastle K, Hughes K. *Evaluation of the South Wales Know the Score# DrinkLessEnjoyMore intervention (Phase 2)*. Centre for Public Health, Liverpool John Moores University, Liverpool. 2016.

[20] Carmichael D. *Prosecutions under s. 141 of the Licensing Act 2003.* Criminal Justice System Statistics, London. 2016. [cited 2/10/2017] Available from: https://www.whatdotheyknow.com/request/prosecutions_under_s141_of_the_l.

[21] Nicholls J, Morris J. *One too many? Sales to drunk customers: policy, enforcement and responsibility*. Alcohol Research UK and the Alcohol Academy, London. 2014.

[22] Cherpitel CJ, Ye Y, Bond J, Borges G, Monteiro M. Relative risk of injury from acute alcohol consumption: modelling the dose–response relationship in emergency department data from 18 countries. *Addiction.* 2015;110(2): 279-88.

[23] Casswell S, You RQ, Huckle T. Alcohol's harm to others: reduced wellbeing and health status for those with heavy drinkers in their lives. *Addiction.* 2011;106(6): 1087-94.

[24] Jones L, Hughes K, Atkinson AM, Bellis MA. Reducing harm in drinking environments: a systematic review of effective approaches. *Health and place*. 2011;17(2): 508-18.

[25] Kurtze N, Wollscheid S, Denison E. *Effects of interventions to counter overserving, serving underage people, and alcohol-related harm/injuries linked to drinking venues*. The Norwegian Knowledge Centre for the Health Services, Oslo. 2014.

[26] Holder HD. *Alcohol and the community: a systems approach to prevention*. Cambridge University Press; 2006.

[27] Graham K, Homel R. *Raising the bar: preventing aggression in and around bars, clubs and pubs.* UK: Willan Publishing, London. 2008.

[28] Norström T, Trolldal B. Was the STAD programme really that successful? *Nordic studies on alcohol and drugs.* 2013;30(3): 171-8.

[29] Wallin E, Norström T, Andréasson S. Alcohol prevention targeting licensed premises: a study of effects on violence. *Journal of studies on alcohol*. 2003; 64(2): 270-7.

[30] Skardhamar T, Fekjær SB, Pedersen W. If it works there, will it work here? The effect of a multi-component responsible beverage service (RBS) programme on violence in Oslo. *Drug and alcohol dependence.* 2016;169: 128-33.

[31] Crime and Disorder Act 1998. ACT. [cited 2/10/2017]. Available from https://www.legislation.gov.uk/ukpga/1998/37/contents.

[32] Bellis MA, Hughes K. Getting drunk safely? Night-life policy in the UK and its public health consequences. *Drug and alcohol review.* 2011;30(5): 536-45.

[33] Quigg Z, Hughes K, Ford K, Hunt A, Hardcastle K, McGee C. *Evaluation of the Liverpool Say No To Drunks Pilot Intervention.* Centre for Public Health Liverpool John Moores University, Liverpool. 2015.

[34] Bellis MA, Hughes K, Quigg Z, Morleo M, Jarman I, Lisboa P. Cross-sectional measures and modelled estimates of blood alcohol levels in UK nightlife and their relationships with drinking behaviours and observed signs of inebriation. *Substance*

abuse treatment, prevention and policy. 2010;5(1): 5.

[35] Select Statistics. Comparing two proportions – sample size. [cited 20/12/2017]. Available from: https://select-statistics.co.uk/calculators/sample-size-calculator-two-proportions/.

[36] NHS Choices. *Alcohol units.* [cited 18/08/2017]. Available from: http://www.nhs.uk/Livewell/alcohol/Pages/alcohol-units.aspx.

[37] Measham F, Brain K. 'Binge'drinking, British alcohol policy and the new culture of intoxication. *Crime, media, culture*. 2005;1(3): 262-83.

[38] Trolldal B, Brännström L, Paschall MJ, Leifman H. Effects of a multi-component responsible beverage service programme on violent assaults in Sweden. *Addiction.* 2012;108(1): 89-96.

[39] Freisthler B, Gruenewald PJ, Treno AJ, Lee J. Evaluating alcohol access and the alcohol environment in neighborhood areas. *Alcoholism: clinical and experimental research*. 2013;27: 477-84.

[40] McClatchley K, Shorter GW, Chalmers, J. Deconstructing alcohol use on a night out in England: Promotions, preloading and consumption. *Drug and alcohol review*. 2014 33(4): 367-75.

[41] Wells S, Graham K, Purcell, J. Policy implications of the widespread practice of 'pre-drinking' or 'pre-gaming' before going to public drinking establishments: are current prevention strategies backfiring? *Addiction*. 2009;104: 4-9.

[42] Ford K, Quigg Z, Butler N, Hughes K. *The service of alcohol to drunks: measuring and supporting compliance with the law in Manchester City Centre's nightli*fe. Public Health Institute, Liverpool John Moores University, Liverpool. 2016.

[43] Morris J. Alcohol Policy UK: Second phase of 'Local Alcohol Action Areas' (LAAA). [accessed 23 June 2017]. Available: http://www.alcoholpolicy.net/2016/10/second-round-of-local-alcohol-action-area-laaa-open.html.

[44] Trimbos Institute. "STAD in Europe," 2017. [Accessed 23/06/2017]. Available: http://stadineurope.eu.

Box 1: Drink Less Enjoy More (DLEM)

- A community-based multi-community intervention designed to prevent excessive drunkenness and related harms amongst nightlife patrons through addressing two intermediate factors:
  - Sales of alcohol to drunk patrons in on-licensed premises; and,
  - Nightlife patron knowledge of associated alcohol legislation.
- The intervention involved the collective implementation of three components:
  - Community mobilisation and awareness raising: including creation of a multi-agency intervention steering group and implementation of a range of awareness (intervention and legislation) raising activities targeted towards different actors, particularly venues and nightlife patrons.
  - Responsible bar server training: free provision of a face-to-face training programme for bar staff on preventing sales of alcohol to drunks.
  - Active enforcement: of existing legislation (not routinely used prior to the intervention) prohibiting sales of alcohol to drunks by police (and municipality officers) through regular engagement with premises (e.g. via letter, scheduled meetings) and monitoring of bar server practices (e.g. unscheduled visits to venues during operating hours).
- Intensively implemented in Liverpool City Centre's nightlife in:
  - 2014: 5 weeks in one section of the nightlife environment (~38 on-licensed venues).
  - 2015: 9 weeks across the full nightlife environment (~220 on-licensed venues).

Table 1: Alcohol test purchases: % of sales refused, and venue, server and actor characteristics, pre-intervention and follow-up

			Pre (n=73)	Follow-up (n=100)	χ^2	*p*
	% of sales refused		16.4%	74.0%	55.926	0.000
Poorly managed and problematic (PMP) venue markers	Low seating		38.2%	36.0%	0.087	ns
	Drink promotions		46.6%	61.0%	3.546	ns
	Young bar staff		45.2%	50.0%	0.389	ns
	Young customers		20.0%	11.1%	2.57	ns
	Noisy bar		35.6%	37.0%	0.035	ns
	Crowded bar		21.9%	24.0%	0.103	ns
	Poor lighting		15.1%	23.0%	1.681	ns
	Rowdy bar		26.0%	21.0%	0.6	ns
	Dirty bar		27.4%	12.0%	6.636	0.010
	Drunk customers		29.6%	26.0%	0.267	ns
	Number of PMP markers	None	20.5%	12.0%	4.223	ns
		1-2	35.6%	47.0%		
		3-4	13.7%	12.0%		
		5-7	23.3%	19.0%		
		8-10	6.8%	10.0%		
Security	Door supervisor present		53.4%	49.0%	0.331	ns
Test purchase	Before midnight		69.9%	68.0%	0.068	ns
	Male server[a]		52.7%	57.0%	0.262	ns
	Pseudo-drunk actor - male		45.2%	39.0%	0.669	ns
	Pseudo-drunk actor pair - female only		24.7%	38.0%	3.798	ns
	Pseudo-drunk actor pair - male only		21.9%	15.0%		
	Pseudo-drunk actor pair - mixed		53.4%	47.0%		

[a]Server gender was not recorded for 18 test purchases (excluded from analyses). ns = not significant.

Table 2: Odds and Adjusted Odds Ratio for alcohol sale refusals; area, venue and test purchase characteristics

			Odds Ratio	p value	Adjusted Odds Ratio[a] (95%CI)	*p*
Area	DLEM implemented		14.47	0.000	14.63 (5.9-36.5)	0.000
Venue	Low seating		0.71	ns	-	-
	Drink promotions		1.18	ns	-	-
	Young bar staff		0.81	ns	-	-
	Young customers		0.50	ns	-	-
	Noisy bar		0.79	ns	-	-
	Crowded bar		1.16	ns	-	-
	Poor lighting		1.18	ns	-	-
	Rowdy bar		0.69	ns	-	-
	Dirty bar		0.39	0.024	-	-
	Drunk customers		0.45	0.024	0.33 (0.13-0.83)	0.019
	Number of PMP markers (Ref=0)	1-2	1.13	ns	-	-
		3-4	0.77	ns	-	-
		5-7	0.66	ns	-	-
		8-10	0.81	ns	-	-
	Door supervisor present		0.59	ns	-	-
Test purchase	Conducted 12am onwards		0.66	ns	-	-
	Female server		1.46	ns	2.55 (1.1-6.0)	0.032
	Female actor		1.31	ns	-	-
	Actor pair gender mix (Ref=male)	Mixed	0.74	ns	-	-
		Female	1.25	ns	-	-

95%CI = 95% confidence intervals. Ref = reference category. ns = not significant. [a]Backward condition logistic regression; only variables that remained in the model are displayed.

Table 3: Nightlife patron survey: patron sample characteristics, alcohol consumption and drunkenness, pre-intervention and follow-up

			Pre (n=214)	Follow-up (n=202)	*p*
Patron sample characteristics					
	Age group (years)	18-21	40.8%	36.3%	
		22-29	39.9%	39.3%	ns
		30+	19.2%	24.4%	
	Male		50.0%	54.5%	ns
	Student		32.9%	30.7%	ns
	Local resident		49.3%	50.2%	ns
	Regular nightlife user [a]		57.0%	53.0%	ns
Alcohol and drunkenness patterns					
	Preloading [b]	%	68.3%	60.5%	ns
		Units	6	6	ns
Total units consumed during the night out [c,d]		Units	15.7	20	0.008
% high level of drunkenness when they leave the city's nightlife [d]		%	53.1%	60.6%	ns

Note. Units presented are median value. ns = not significant. [a]Visit city's nightlife at least once a month. [b]Of those who had consumed alcohol prior to survey completion only (pre, n=205; follow-up, n=186). [c]Including reported and, or expected consumption. [d]Of those who had consumed alcohol pre-survey, or expected to consume alcohol post-survey (pre, n=210; follow-up, n=193). Drunkenness was measured on a scale of one (completely sober) to 10 (very drunk), with values categorised into high drunkenness when higher than the mean value of the sample, or low if less than or equal to the mean.

Table 4: Nightlife patron survey: Odds and Adjusted Odds Ratio of knowledge of alcohol legislation amongst drinkers: area and patron sample characteristics

			Alcohol Legislation: sell alcohol to drunks[a]				Alcohol Legislation: buy alcohol for drunks[a]			
			Odds Ratio	*p*	Adjusted Odds Ratio[b] (95%CI)	*p*	Odds Ratio	*p*	Adjusted Odds Ratio[b] (95%CI)	*p*
Area		DLEM implemented	2.418	0.000	2.65 (1.74-4.03)	0.000	2.641	0.000	2.73 (1.80-4.13)	0.000
Patron sample characteristics	Age group (years; Ref=18-21)	22-29	1.246	ns	-	-	1.321	ns	1.36 (0.85-2.18)	ns
		30+	1.559	ns	-	-	2.08	0.007	2.08 (1.20-3.62)	0.009
		Male	0.894	ns	-	-	0.779	ns	-	-
		Student	1.035	ns	-	-	0.905	ns	-	-
		Local resident	1.629	0.016	-	-	1.002	ns	-	-
		Regular nightlife user	1.181	ns	-	-	0.789	ns	-	-
Alcohol consumption and drunkenness		Preloaded	0.744	ns	-	-	1.041	ns	-	-
		Total units consumed during the night out	0.992	ns	-	-	1.002	ns	-	-
		% high level of drunkenness when they leave the city's nightlife	0.576	0.007	0.53 (0.35-0.81)	0.003	0.803	ns	-	-

95%CI = 95% confidence intervals. Ref = reference category. ns = not significant. [a] n=394 (models only includes cases who had, or expected to consume alcohol on the night of survey [drinkers=403] and had complete data). [b] Backward condition logistic regression; only variables that remained in the model are displayed.

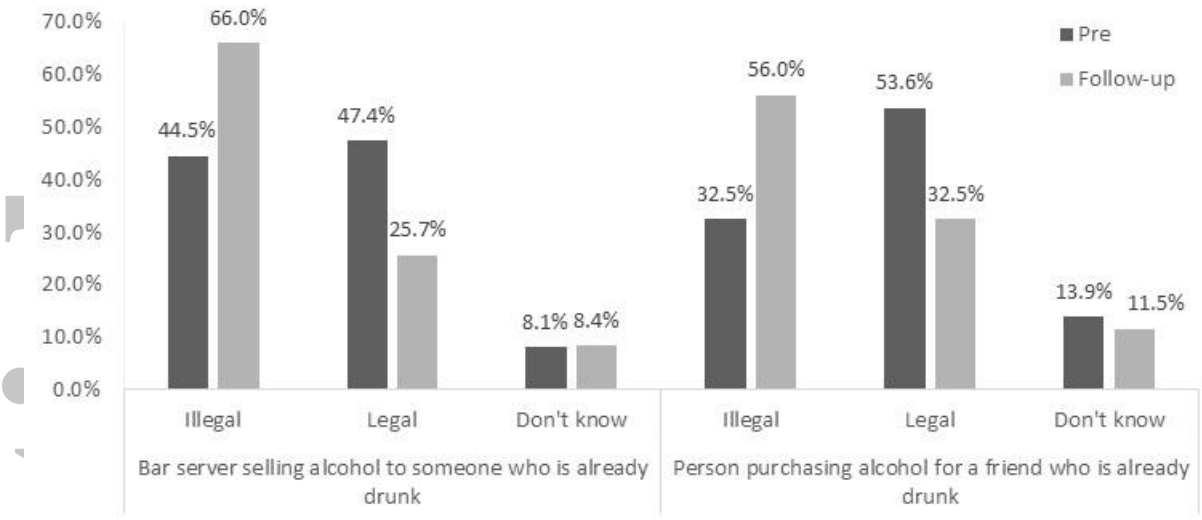

Figure 1: Nightlife patron survey: drinkers knowledge of alcohol legislation, pre-intervention and follow-up